BIOTECHNOLOGY_PRINCIPLES & PROCESSES

1. Utilisation of biological knowledge for the production of materials useful to society is called:
   (a) Biotechnology
   (b) Bioengineering
   (c) Applied Biology
   (d) Molecular Biology
2. Genetic engineering means:
   (a) manipulation of genes
   (b) experiments on tissue culture
   (c) manipulation of chromosomes
   (d) producing completely new types of genes
3. Genetic engineering is:
   (a) making artificial genes
   (b) production of alcohol by using microorganisms
   (c) hybridisation of DNA of one organism to that of others
   (d) making artificial limbs, diagnostic instruments such as ECG, EEG, etc.
4. In genetic engineering, recombinant DNA means:
   (a) DNA with a piece of RNA
   (b) DNA with a piece of foreign DNA
   (c) DNA which takes part in recombination
   (d) DNA not associated with recombination
5. Transfer of any gene into a completely different organism can be done through:
   (a) genetic engineering
   (b) transformation
   (c) tissue culture
   (d) none of these
6. A technique which involves deliberate manipulation of genes within or between species is called:
   (a) gene therapy
   (b) tissue culture
   (c) genetic engineering
   (d) hybridoma technology
7. Who discovered recombinant DNA (rDNA) technology?
   (a) James D. Watson
   (b) Har Gobind Khorana
   (c) Walter Sutton and Oswald Avery
   (d) Stanley Cohen and Herbert Boyer
   (e) William Bateson and Hugo de Vries
8. Which one of the following techniques made it possible to genetically engineer living organisms?
   (a) Hybridization
   (b) X-ray diffraction
   (c) Heavier isotope labelling
   (d) Recombinant DNA techniques
9. A recombinant DNA molecule can be produced in the absence of the following:
   (a) E.coli
   (b) DNA ligase
   (c) DNA fragments
   (d) Restriction endonuclease
10. Advancement in genetic enginTing has been possible due to:
    (a) oncogenes (b) transposons
    (c) exonucleases (d) endonucleases

11. Restriction endonuclease is used in:
    (a) tissue culture
    (b) genetic engineering
    (c) cell fractionation
    (d) regeneration of tissues
12. The function of restriction enzyme is :
    (a) cleavages of fat
    (b) cleavages of DNA
    (c) cleavages of starch
    (d) cleavages of protein
13. 'Restriction' in Restriction enzyme tefers to:
    (a) Prevention of the multiplication of bacteriophage in bacteria
    (b) Cleaving ofphosphodiester bond in DNA by the enzyme
    (c) Cutting of DNA at specific position only
    (d) All of the above
14. Which of the endonuclease is mostly used in genetic engineering?
    (a) Type I
    (b) Type II
    (c) Type III
    (d) (a) and (c)
15. The enzymes commonly used in genetic engineering are:
    (a) Restriction endonuclease and polymerase
    (b) Restriction endonuclease and ligase
    (c) Endonuclease and ligase
    (d) Ligase and polymerase
16. The enzyme used to cut the DNA molecule is:
    (a) DNA ligases
    (b) 2 galactosidase
    (c) DNA polymerases
    (d) RNA polymerases
    (e) Restriction endonuclease
17. Which one of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain?
    (a) Lipase
    (b) Protease
    (c) Exonuclease
    (d) Endonuclease
18. Restriction enzyme was discovered by:
    (a) Milstein and Kohler
    (b) Temin and Baltimore
    (c) Arber, Nathans and Smith
    (d) Holley, Khorana and Nirenberg
19. Which enzyme acts as biological scissors in genetic engineering?
    (a) Ligases
    (b) Nucleases
    (c) Polymerases
    (d) Restriction endonucleases
20. Restriction endonucleases are useful in:
    (a) breaking DNA at specific sites
    (b) producing sticky DNA ends
    (c) both (a) and (b)
    (d) crossing over

21. Which of the following statements does not hold true for -1 restriction enzyme?
(a) It is an endonuclease
(b) It is isolated from viruses
(c) It recognises a palindromic nucleotide sequence
(d) It produces the same kind, of sticky ends in different DNA molecules

22. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with:
(a) ligase (b) gyrase
(c) exonuc lease (d) endonuclease

23. In nature, the function of restriction enzymes is to:
(a) to cut plasmids
(b) destroy phage DNA
(c) splice DNA in a cell
(d) destroy foreign DNA in animal cells

24. Which of the following cut DNA at specific sites?
(a) Ligase
(b) Exonuclease
(c) Alkaline phosphatase
(d) Restriction endonuclease

25. Chemical knives of DNA are:
(a) ligases
(b) polymerases
(c) endonuc leases
(d) transcriptases

26. Molecular scissors, which cut DNA at specific site:
(a) ligase
(b) cellulase
(c) pectinase
(d) polymerase
(e) restriction endonuclease

27. Restriction enzymes are present in several microorganisms cut foreign DNA at specific sites and destroy them. The enzymes do not destroy the cellular DNA because:
(a) the cellular DNA does not have the specific sites
(b) the susceptible specific sites are masked by proteins
(c) the restriction enzyme susceptible sites are modified by cellular enzymes
(d) the restriction enzymes and DNA occupy different compartments

28. Restriction endonuclease are utilized in genetic engineering as:
(a) molecular build up at nucleotides
(b) molecular degradation to DNA break up
(c) molecular scalpels for cutting DNA at specific sites
(d) molecular cement for combining DNA bits into long chains

29. Which of the following is true concerning restriction endonucleases? They :
(a) are carbohydrates
(b) destroy host cell DNA
(c) are transposable elements
(d) recognize and cut specific DNA sequences

30. In recombinant DNA experiments .....is used to cut pieces of DNA and..... joins these segments to form recombinant DNA:
(a) a plasmid ..... DNA ligase
(b) a transposon ..... a plasmid
(c) DNA ligase ..... a restriction enzyme
(d) a restriction enzyme ..... DNA ligase

31. When a typical restriction enzyme cuts a DNA molecule, the cuts are uneven, so that the DNA fragments have single-stranded ends. These ends are useful in recombinant DNA work because:
(a) they serve as starting points for DNA replication
(b) only single stranded DNA segments can code for proteins
(c) they enable researchers to use the fragments as molecular probes
(d) the fragments will bond to other fragments with complementary ends.

32. EcoRI is an example of:
(a) Exonuclease
(b) Endonuclease
(c) RNA polymerase
(d) Specific site of restriction endonuclease

33. There is a restriction endonuclease called EcoRl. What does "co" part in it stand for?
(a) coli
(b) colon
(c) coelom
(d) co-enzyme

34. A restriction enzyme Eco RI from E. coli is expected to cleave DNA at following sequence:
(a) GAATTC
(b) AAGTTC
(c) AAGCTT
(d) GTATATC
(e) TATAGC

35. The specific DNA sequence where Eco RI cuts is:
(a) ATTCGA
TAAGCT
(b) GAATTC
CTTAAG
(c) GCTTAA
CGAATT
(d) GTTCAA
CAAGTT
(e) TTCGAA
AAGCTT

36. Sticky ends are produced by following restriction enzyrnt, except:
(a) Smal
(b) Pst I
(c) Hae II
(d) BarrtH I

37. Which of the following restriction enzymes produce bllz • ends?
(a) Sma I
(b) Hae III
(c) Alu I
(d) All of these

38. Which of the following forms chemical scissors?
(a) EcoRl
(b) Hind III
(c) Barn HII
(d) All of these

39. Which of the following could be a restriction enzyme recognition site?
(a) ATGCAT
(b) ATCATC
(c) AAAGGG
(d) ATCCTA

40. Which one of the following can give a complementary and palindromic sequence?
(a) 5' ATATCC3'
(b) 5'CCGAAT3'
(c) 5'GAATTC3'
(d) 5'AGGTTC3'

41. Which of the following produce DNA fragments with “sticky ends”?
(a) DNA ligase
(b) Restriction enzymes
(c) DNA polymerase
(d) All of these

42. The end of fragments of DNA molecule are sticky due to *
(a) free methylation
(b) endonuclease
(c) unpaired bases
(d) calcium ions

43. While isolating DNA from bacteria, which of the follol''ving enzymes is not used?
(a) Protease
(b) Lysozyme
(c) Ribonuclease
(d) Deoxyribonuclease

44. An enzyme catalysing the removal of nucleotides from the ends of DNA is:
(a) Hind –II
(b) DNA ligase
(c) exonuclease
(d) endonuclease

45. Which of the following bacteria is not a source of restriction endonuclease?
(a) Escherichia coli
(b) Bacillus amyloli
(c) Haemophilus influenzae
(d) Agrobacterium tumefaciens

46. Construction of a recombinant DNA involves:
(a) cleaving and rejoining DNA segments with 'endonuclease ' alone
(b) cleaving DNA segments with ‘endonuclease’ and rejoining them with ligase'
(c) cleaving DNA segments with ligase' and rejoining them with ‘endonuclease'
(d) cleaving and rejoining DNA segments with ligase alone

47. The enzyme used to join the DNA fragments is:
(a) DNA ligase
(b) Topoisomerase
(c) DNA polymerase
(d) Reverse transcriptase
(e) Adenosine deaminase

48. The linking of antibiotic resistance gene with the plasmid vector became possible with:
(a) Exonucleases
(b) DNA ligase
(c) Endonucleases
(d) DNA polymerase

49. The role of DNA ligase in the construction of a recombinant DNA molecule is:
(a) Formation of phosphodiester bond between two DNA fragments
(b) Formation of hydrogen bonds between sticky ends of DNA fragments
(c) Ligation of all purime and pyrimidine bases
(d) None of the above

50. Which of the following techniques is used to separate proteins?
(a) Gel electrophoresis
(b) Isoelectric focusing
(c) Polymerase chain reaction
(d) Ion-exchange chromatography

51. In agarose gel electrophoresis, DNA molecules are separated on the basis of their:
(a) size only
(b) charge only
(c) charge to size ratio
(d) all of these

52. Which of the given statement is correct in the context of observing DNA separated by agarose gel electrophoresis?
(a) DNA can be seen in visible light
(b) DNA can be seen without staining in visible light
(c) Ethidium bromide stained DNA can be seen in visible light
(d) Ethidium bromide stained DNA can be seen under exposure to UV light

53. A mixture containing DNA fragments, A, B,C and D with molecular weights A + B = C, A > B and nD > C, was subjected to agrose gel electrophoresis. The position of these fragments from cathode to anode sides of gel should by:
(a) B, A, C, D
(b) A, B, C, D
(c) C, B, A, D
(d) B, A, D, C

54. Agarose extracted from sea weeds finds use in:
(a) Tissue culture
(b) PCR
(c) Gel electrophoresis
(d) Spectrophotometry

55. Which one is used as vector in genetic engineering?
(a) Plasmid
(b) Bacterium
(c) Cyanophage
(d) None of these

56. In genetic engineering, the terms vector is applied for:
(a) virus
(b) plasmid
(c) sources of DNA
(d) cell which receives

57. The autonomously independent, self replicating extra/ nuclear DNA imparting certain factors to some bacterium is called:
(a) cosmid
(b) plastid
(c) plasmid
(d) phagemid

58. An extrachromosomal DNA which can be used as vector in gene cloning is called:
(a) axon
(b) intron
(c) plasmid
(d) transposon

59. So far the genetic engineering of plants has not resulted in significant increases in food production because:
(a) genetically engineered plants are very expensive
(b) the vectors used do not work with many food plants
(c) agricultural scientists have not pursued it seriously
(d) new plant diseases have evolved faster than expected

60. Plasmid:
(a) is a component of cell wall of bacteria
(b) is a structure which helps in respiration
(c) consists of genes found inside the nucleus
(d) is the genetic part in addition to DNA in microorganisms

61. Plasmids are:
(a) c DN A
(b) viral RNA
(c) mitochondria' DNA
(d) circular extrachromosomal DNA in bacteria

62. Plasmids are suitable vectors for gene cloning because:
(a) these are small circular DNA molecules which can integrate with host chromosomal DNA
(b) these are small circular DNA molecules with their own replication origin site
(c) these can shuttle between prokaryotic and eukaryotic cells
(d) these often carry antibiotic resistance genes

63. Plasmid is a:
(a) double stranded circular DNA
(b) extrachromosomal linear DNA
(c) single stranded DNA
(d) none of the above

64. A plasmid:
(a) cannot replicate
(b) can replicate independently
(c) shows independent assortment
(d) lives together with chromosomes

65. Which of the following is not correct statement about the plasmids?
(a) It is the extrachromosomal DNA in bacteria
(b) It is not an integral part but inert genetic material
(c) Host chromosome can be integrated with the plasmid
(d) Transfer of plasmid can be done from cell to cell without killing the host

66. Plasmids that carry genes to provide resistance to antibiotics are called:
(a) R plasmids
(b) C plasmids
(c) A plasmids
(d) Ti plasmids

67. Identify the plasmid:
(a) AIU I
(b) Hind III
(c) Eco RI
(d) pBR322

68. The plasmid pBR 322 used in biotechnology is:
(a) Yeast
(b) M32 Phage
(c) Parasite
(d) Cloning vehicle

69. Which of these are correct'in view of genetic engineering?
(a) It uses resistant plasmid pBR322
(b) DNA molecules are broken down by topoisomerase
(c) The recombined DNA or rDNA is called chimeric DNA
(d) Both (a) and (c)

70. A plasmid that have been cleaved with EcoRI can hybridize with another plasmid that has been:
(a) digested with EcoRI
(b) in a Southern blot
(c) digested with HindIII
(d) cleaved with BamHI

71. During "gene cloning" which is called as "gene taxi"?
(a) vaccine
(b) plasmid
(c) bacterium
(d) protozoa

72. What is the function of a vector?
(a) Helps to amplify the DNA
(b) Allows cells to take up foreign DNA
(c) Destroys cells that do not contain cloned DNA
(d) Carries cloned DNA, enabling it to replicate in host cells

73. Which one of the following is used as vector for cloning ,yi genes into higher organisms ?
(a) Retrovirus
(b) Baculovirus
(c) Rhizopus nigricans
(d) Salmonella typhimurium

74. The vector for T-DNA is:
(a) Thermus aquaticus
(b) Salmonella typhimurium
(c) Agrobacterium tumefaciens
(d) Escherichia coli
(e) Bacillus thuringiensis

75. Polyethylene glycol method is used for:
(a) Energy production from sewage
(b) Gene transfer without a vector
(c) Seedless fruit production
(d) Biodiesel production

76. The tumour inducing capacity of Agrobacterium tumefaciens is located in large extrachromosomal plasmids called:
(a) pBR 322
(b) Ri plasmid
(c) Ti plasmid
(d) Lambda phage

77. Crown gall disease in plants is caused by:
(a) Ti-plasmid (b) Pi-plasmid
(c) bacteria (d) virus

78. A direct procedure to copy the gene sequence of interest is called:
(a) TPA
(b) PCR
(c) BCG
(d) None of these

79. PCR stands for:
(a) polymerase chain reaction
(b) politically correct research
(c) polygraphed criminal rating
(d) polyploid chromosome restrictions

80. Manipulation of DNA in genetic engineering become ed due to the invention of :
(a) Dot blot
(b) Eastern blotting
(c) Polymerase chain reaction
(d) Enzyme-linked immunosorbent assay

81. Thermal cycler is used in thisreaction:
(a) Radioactivity
(b) Chemical reactions
(c) Polymerase chain reaction
(d) Enzyme catalysed reactions

82. PCR technique was invented by:
(a) Boyer
(b) Cohn
(c) Sanger
(d) Kary Mullis

83. The polymerase chain reaction is a technique that is used for:
(a) in vivo replication of DNA
(b) in vivo synthesis of mRNA
(c) in vitro synthesis of mRNA
(d) in vitro replication of specific DNA sequence using thermostable DNA polymerase

84. Palaeontologists unearthed a human skull during excavation. A small fragment of the scalp tissue was still attached to it. Only little DNA could be extracted from it. If the genes of the ancient man need to be analysed the best way of getting sufficient amount of DNA from this extract is:
(a) hybridising the DNA with a DNA probe
(b) subjecting the DNA to gel electrophoresis
(c) subjecting the DNA to polymerase chain reaction
(d) treating the DNA with restriction endonucleases

85. What is the utility of the bacterium, Thermus aquaticus?
(a) It is used in RFLP mapping
(b) It is used to create recombinant plasmids
(c) It is used in automated DNA sequencing
(d) It facilitates the polymerase chain reaction

86. In PCR technology the DNA segment is replicated over a . billion times. This repeated replication is catalysed by the enzyme:
(a) DNA dependent RNA polymerase
(b) DNA polymerase
(c) Taq polymerase
(d) Primase

87. The polymerase chain reaction uses Taq polymerase rather than a DNA polymerase from E. coli, because Taq polymerase:
(a) is heat-stable
(b) is easier to obtain
(c) can denature a double stranded DNA template
(d) can initiate DNA synthesis at a wider variety of sequences

88. The polymerase chain reaction generates a fragment of a distinct size even when an intact chromosome is used as template. What determines the boundaries of the amplified fragment?
(a) The sites to which the primer anneal
(b) The duration of the elongation step in each cycle
(c) The temperature of the elongation step in each cycle
(d) The concentration of one particular deoxynucleotide in the reaction

89. PCR proceeds in three distinct steps governed by temperature, they are in order of:
(a) Synthesis, Annealing, Denaturation
(b) Annealing, Synthesis, Denaturation
(c) Denaturation, Synthesis, Annealing
(d) Denaturation, Annealing, Synthesis

90. Which of the following steps are catalysed by Taq polymerase in a PCR reaction?
(a) Extension of primer end on the template DNA
(b) Annealing of primers to template DNA
(c) Denaturation of template DNA
(d) All of the above

91. Cloning gene is process where:
(a) gene is cloned in an animal
(b) fragments of DNA are transferred from one organism to another usually carried on a DNA vector
(c) fragment of DNA cloned in the same organism using carrier
(d) DNA is cloned in plants

92. The following steps are used to make a recombinant celi What is the fourth step?
(a) Isolate gene of interest
(b) Insert gene into a vector
(c) Vector is taken up by cell
(d) Clone cell containing vector

93. Foreign DNA that was inserted into a plasmid and then replicated many times in a population of bacteria is a:
(a) Gene map (b) DNA clone
(c) Gene library (d) DNA probe

94. Significance of 'heat shock' method in bacterial transformation is to facilitate:
(a) Binding of DNA to the cell wall
(b) Expression of antibiotic resistance gene
(c) Uptake of DNA through membrane transport proteins
(d) Uptake of DNA through transient pores in the bacterial cell wall

95. Widely used tool in genetic engineering of crop plant involves:
(a) Microinjection
(b) Protoplast fusion
(c) Transposon mediation
(d) Agrobacterium mediation

96. In genetic engineering, Agrobacterium is used to:
(a) transform plant cells
(b) transform bacterial cells
(c) identify recombinant clones
(d) genetically engineer bacteria

97. Tumor inducing (Ti) plasmid transforms:
(a) plants
(b) fungi
(c) bacteria
(d) animals

98. Electroporation procedure involves:
(a) fast passage of food through sieve pores in phloem ele ments with the help of electric stimulation
(b) opening of stomatal pores during night by artificial light
(c) making transient pores in the cell membrane to intro duce gene constructs
(d) purification of saline water with the help of a membrane system

99. Biolistic technique is used in:
(a) Tissue culture process
(b) Gene transfer process
(c) Hybridization process
(d) Germplasm conservation process

100. Two microbes found to be very useful in genetic engineering are:
(a) Diplococcus sp. and Pseudomonas sp.
(b) Vibrio cholerae and a tailed bacteriophage
(c) Crown gall bacterium and Caenorhabditis elegans
(d) Escherichia coli and Agrobacterium tumefaciens

101. In plant biotechnology, root tumours are induced in plant using the bacterium:
(a) Agrobacterium rhizogenes
(b) Agrobacterium basilis
(c) Rhizobium
(d) None of the above

102. Which of the following is correctly matched?
(a) Agrobacterium tumefaciens — Tumour
(b) Thermus aquaticus — Bt-gene
(c) pBR322 — Enzyme
(d) Ligase — Molecular scissors
(e) Hind II — Plasmic, vector

103. Which of the following should be chosen for best yield if one were to produce a recombinant protein in large amounts?
(a) A stirred-tank bioreactor without in-lets and out-lets
(b) Laboratory flask of largest capacity
(c) A continuous culture system
(d) Any of the above

104. Stirred-tank bioreactors have been designed for:
(a) Ensuring anaerobic conditions in the culture vessel
(b) Availability of oxygen throughout the process
(c) Addition of preservatives to the product
(d) Purification of the product